Claims:

What is claimed is:

1.   A quantum well infrared photodetector comprising:

a plurality of doped quantum well layers forming a multi-quantum well structure for providing high absorption at temperatures other than low temperatures; and,

contact layers for receiving current from the plurality of quantum well layers.

2.   A quantum well infrared photodetector according to claim 1 wherein the multi-quantum well structure is for providing high absorption at temperatures near room temperature.

3.   A quantum well infrared photodetector according to claim 2 wherein the plurality of doped quantum well layers includes more than 10 quantum well layers.

4.   A quantum well infrared photodetector according to claim 3 wherein the dopant concentration is selected to be sufficiently large for high absorption during near room temperature operation.

5.   A quantum well infrared photodetector according to claim 4 wherein the doping density (N_d) is given by $N_d=(m/\pi\hbar^2)(2k_BT)$, where m is the effective mass, $\hbar$ is the Planck constant, k_B is the Boltzmann constant, and T is the desired operating in degrees K.

6.   A quantum well infrared photodetector according to claim 5 wherein the well material is GaAs, the barrier material is Al GaAs, and the operating temperature is room temperature and N_d is in the range of $1 - 2E12 \text{ cm}^{-2}$.

7.   A quantum well infrared photodetector according to claim 6 wherein the contact layers are formed of GaAs doped with Si to a concentration of $1E17$ to $5E18 \text{ cm}^{-3}$.

8.   A quantum well infrared photodetector comprising:

a plurality of doped quantum well layers forming a multi-quantum well structure

for providing high absorption and dark current at temperatures other than low

5   temperatures; and,

contact layers for receiving current from the plurality of quantum well layers.

9.   A quantum well infrared photodetector comprising:

a plurality of quantum well layers formed of a first semiconductor material and

10   doped forming a multi-quantum well structure for providing high absorption at

temperatures other than low temperatures and substantial dark current;

barriers between the quantum well layers formed of a second semiconductor

material; and,

contact layers comprising a third doped semiconductor.

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10.   A quantum well infrared photodetector according to claim 9 wherein temperatures

other than low temperatures include temperatures at or near room temperature.

11.   A quantum well infrared photodetector according to claim 10 wherein the first

20   semiconductor material is GaAs.

12.   A quantum well infrared photodetector according to claim 11 wherein the dopant

for doping the first semiconductor material is Si.

25   13.   A quantum well infrared photodetector according to claim 12 wherein dopant

concentration of the Si is approximately $1 - 2E12 \text{ cm}^{-2}$.

14.   A quantum well infrared photodetector according to claim 13 wherein second

semiconductor material is Al GaAs.

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15.   A quantum well infrared photodetector according to claim 14 wherein fraction of

Al is from 10%-50%.

16. A quantum well infrared photodetector according to claim 15 wherein the third doped semiconductor material is GaAs doped with Si.

5   17. A quantum well infrared photodetector according to claim 16 wherein the third doped semiconductor material is doped with Si to a concentration of 1E17 to 5E18 cm^{-3}.

18. A quantum well infrared photodetector according to claim 17 wherein the third doped semiconductor material of a thickness within a range of 0.1-2 μm.

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19. A quantum well infrared photodetector according to claim 8 wherein the plurality of doped quantum well layers is designed for operation at frequencies above 1 GigaHz.

20. A quantum well infrared photodetector according to claim 19 wherein the
15 plurality of doped quantum well layers is designed for operation at frequencies above 30 GigaHz.

21. A method of detecting infrared radiation comprising the steps of:
detecting infrared radiation with a quantum well device absent cryogenic cooling; and,
20 determining an intensity of the detected infrared radiation.

22. A method of detecting infrared radiation according to claim 19 wherein the step of determining comprises the step of:
filtering the dark current component of the detected signal to determine an
25 intensity of the detected infrared radiation.

23. A method of detecting infrared radiation according to claim 19 wherein the step of detecting is performed at or near room temperature